

thickness to solely and precisely form the pre-specified geometric pattern (equidistant circles or diamond-shape formation or rectangular stripes). The concept and manner in which these geometries are applied to improve the paper and/or board functionality are not trivial and "not obvious to one of ordinary skill in the art to optimize the weight percentage of the paper."

Neither Caldwell, or Conforti, or Ungar '062 which is the primary basis of a refusal of claim 2 in combination with Conforti pertain to the subject matter of the claimed invention. There is no discussion, suggestion or even remote inkling that these patents or the processes set forth therein improve paper or board functionality. ^{instead of} None of these documents discuss, disclose or suggest a discontinuous polymer film that forms a specific geometric pattern which penetrates or impregnates the sheet. All the references cited by the Office apply a continuous coating layer that covers the sheet, and each purports to improve the abrasion resistance of the final product. Our claims expressly pertain to improving the sheet functionality, namely fracture, toughness and ductility, through the application of a "discontinuous film", which penetrates or impregnates through the sheet thickness to form "islands that will serve as a mechanism for crack retardation and fracture impedance". (See the Detailed Description of the Preferred Embodiments in the application, lines 16 and 17.)

To form these precise patterns, only solid, low concentrations are required as is thoroughly outlined in our patent application and set forth in the claims. Approximately 5% to 20% of polymer by basis weight of the paper or board is required to yield the desired properties. This determination is intrinsically related to the premise of creating precisely shaped, discontinuous islands that serve as crack arrester, or regions of crack retardation. This is not merely obvious of one of ordinary skill in the art. Further, it is not an optimization exercise, since 20% is roughly the maximum allowed to penetrate

the voids and inter-space within the network to produce perfect through thickness penetration and precise planer absorption.

Our invention focuses on reinforcement for the sheet (fibrous network) by applying a discontinuous polymer film, which is absorbed through the sheet thickness into precisely defined geometric entities. The surface of the sheet may then be coated or prepared for whatever end use application. Moreover, nowhere in our process do we mix, extrude or mold a polymer material or double coat a cellulose fiber network web with molded polymer material as set forth in item 2 of the Examiner's comments.

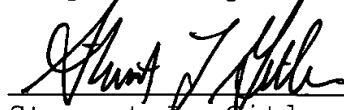
All of the references cited, Caldwell, Ungar, and Conforti are unrelated to the invention claimed and their work principally, if not solely, addresses a continuous film coating to produce better abrasion properties, which is not the focus nor contemplation of the present invention.

Moreover, our invention, as claimed, involves a method to reinforce a fibrous network and improve its functionality, that is intrinsically associated with the desired objective of achieving a reinforced network of superior performance. The method allows the use of either thermoset or thermoplastic polymers.

Therefore, applicant respectfully traverses the refusals and requests that claims 1-8, as presently on file, be approved. The cited references in no way relate to, suggest, or remotely disclose the claimed invention.

Applicant encloses formal drawings addressing all potential informalities.

Respectfully submitted,



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4. (Amended) The crack-resistant paper or board as claimed in claim 1, wherein the polymer is approximately 5%-20% of a basis weight of the paper or board.

Marked-Up Claim

4. (Amended) The crack-resistant paper or board as claimed in claim 1, wherein the polymer is approximately 5%-20% of a basis weight of the paper or board.